

### **Limited Visual Dam Safety Inspection Summary Report**

**MA-077** 

Reservoir 40

Maui, Hawaii

#### Prepared by:

U.S. ARMY CORPS OF ENGINEERS HONOLULU ENGINEER DISTRICT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

May 2006

Dam ID:	MA-0077	
Name: Re	eservoir 40_	

Limited Visual Dam Safety Inspection Conducted on: 04 April 2006

#### I. Purpose

Due to disaster occurrences of periodic heavy rains and flooding, which has caused extensive damage to property and loss of lives, the Governor has issued a State of Emergency Proclamation extending from February 20, 2006 to April 9, 2006. In light of the tragic failure of the Kaloko dam on Kauai and the continued forecast of heavy rains, emergency inspections of all regulated dams in all counties are being undertaken.

These inspections are for the purpose of determining if any of the regulated dams and reservoirs in the City and County of Honolulu, Maui County or Hawaii County, are suspect for immediate concern to the downstream area under the prolonged conditions of heavy rain showers.

#### II. Authority

Inspections are authorized under the Hawaii Dam Safety Act of 1987, Chapter 179D "Dams and Reservoirs" of Hawaii Revised Statues, and Title 13, Subtitle 7, Chapter 190, "Dams and Reservoirs" of the Hawaii Administrative Rules.

These inspections are being conducted under joint agreements of the U.S. Army Corps of Engineers (USACE), the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), and the State of Hawaii. The Memorandum of Agreement with the U.S. Army Corps of Engineers is entered into pursuant to 10 U.S.C. § 3036(d)(2), and the Intergovernmental Cooperation Act (31 U.S.C. §6505), and established via support agreement number DL-06-01.

#### III. Scope

Visual inspection will be made on parts of the embankment and appurtenant works readily available and visible for inspection by the inspection team at the time of the inspection. Such parts and appurtenant works would include the upstream slope, crest, downstream slope, abutments and toes, outlet works, and spillway.

On the date of this limited visual inspection, there may appear to be no immediate threat to the safety of the dam, however no assurance can be made regarding the dam's condition after this date. Subsequent adverse weather and other factors may affect the dam's condition.

Dam ID:	MA-0077	
Name: Re	eservoir 40	

#### IV. Limitations of Findings and Recommendations

The inspection is based only on visible features/areas of the dam on the day of inspection. The inspection does not entail detailed stability, hydrologic, hydraulic, or seismic investigations. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies.

V. Inspection Team

OrganizationName / TitleU.S. Corps of EngineersHenri Mulder, P.E.

Civil Engineer

State of Hawaii, Dept. of Land and Natural Resources Hiram Young

VI. Owner's Representatives Present

Hawaiian Commercial & Sugar Company Randall Moore

Rodney Chin

VII. Inspection Team

OrganizationNameU.S. Corps of EngineersDerek Chow

Bill Empson

State of Hawaii, Dept. of Land and Natural Resources Denise Manuel

Edwin Matsuda

#### VIII. Dam Type

The dam appeared to be an earthen embankment dam.

Dam ID:	MA-0077	
Name: Ro	eservoir 40_	

#### IX. Dam Classification

The current hazard classification of this dam is: High

Hazard Potential Classification based on the following:

Category	Loss of Life	Economic Loss
Low	None Expected	Minimal (undeveloped to occasional structures
		or agriculture)
Significant	Few (No Urban development and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than a few	Extensive community, industry or agriculture.

Based on inventoried storage and height data, the size classification of the dam is: Most likely Intermediate but insufficient information is available to inspectors to make a determination.

Size Classification based on the following:

Category	Storage (Acre-Feet)	Height (feet)
Small	< 1000	< 40
Intermediate	> 1000 and < 50,000	> 40 and < 100
Large	> 50,000	> 100

#### X. Summary of Inspection

Condition Rating Criteria: The conditional terms in this report are used to generally describe the conditions below. Inspections, monitoring, and additional investigations are considered to be incidental to all condition ratings.

Satisfactory	Expected to fulfill intended function.
Fair	Expected to fulfill intended function, but maintenance is recommended.
Poor	May not fulfill intended function; maintenance or repairs are necessary.
Unsatisfactory	Is not expected to fulfill intended function; repair, replacement, or modification is necessary.
Unknown	Not visible, not accessible, not inspected, or unable to determine the condition rating based on the observation taken.

Dam ID:	MA-0077	
Name: Re	eservoir 40	_

#### A. General appearance:

The dam consists of an earth fill embankment. The dam is approximately 45 feet tall and 810 feet in length. The reservoir is feed by an irrigation ditch. The purpose of the reservoir is irrigation.

Findings and Corrective Actions:

- a. The Owner shall maintain documentations including Construction plans, specifications, improvements, modifications, Operations and Maintenance Manuals and routine inspection logs for this dam facility.
- b. An EAP is required for High Hazard Dams. Submit an updated EAP for this facility.
- Submit narrative and additional information detailing the improvements, modifications, and/or alterations at the dam site, unless covered by approved dam permit.
- d. Routine inspection logs were not inspected.
- e. Access to site appears to be satisfactory.
- f. Provide a detailed narrative of the incident, responses taken, and any damages incurred. Dam owners are required to promptly advise the department of any sudden or unprecedented flood or unusual or alarming circumstance or occurrences, which may adversely affect the dam or reservoir.
- g. Submit current Operations and Maintenance Manual or Procedures for this dam / reservoir facility.
- h. Emergency Alarms / Monitors: There were no alarms or monitors observed on this reservoir.
- i. Power / Communication: There were no communication systems observed on this reservoir.

#### B. Access / Security:

Access to the dam was accomplished via a private roadway.

A four-wheel drive vehicle is required.

Security issues. Access to the dam is unrestricted.

#### C. Intake Works:

The intake ditch is approximately 6' wide by 3' high and is rectangular in shape.

The surface of the intake ditch is concrete.

The control for the intake ditch is by a gate where the flow can either be shut off or bypassed.

The source of water is from the irrigation ditch.

Findings and Corrective Actions:

- a. The intake works were not tested.
- b. The intake works appeared to be in satisfactory condition, no corrective actions are required at this time.

Dam ID:	MA-0077	
Name: Re	eservoir 40_	

#### D. Reservoir:

The reservoir level was 37.5' feet per gage at the time of inspection. The normal operating level varies from 32 to 37' per feet per gage. Staff gage consists of post located on the upstream slope of the dam.

Findings and Corrective Actions:

a. The reservoir was not inspected.

#### E. Upstream Slope: (Satisfactory)

The upstream slope was 1 on 1 to 1 on 1.5.

There were no erosion, cracks and sinkholes observed.

The slope is protected with grouted riprap.

The slope is practically clear of vegetation with only a few small shrubs.

#### Findings and Corrective Actions:

**a.** The upstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.

#### F. Crest: (Satisfactory)

The dam crest was approximately 15 feet wide.

There is a dirt road access to the crest.

The crest has no vegetation.

#### Findings and Corrective Actions:

a. The dam crest appeared to be in satisfactory condition, no corrective actions are required at this time.

#### G. Downstream Slope: (Fair)

The downstream slope was approximately 1 on 1.

Some areas of the slope had dense vegetation, so inspection was difficult.

#### Findings and Corrective Actions:

- a. The downstream slope appeared to be in fair to poor condition and requires corrective action.
- b. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.
- c. Tree(s) were observed on the downstream slope. Trees have been identified as the probable cause of piping failures, and can possibly cause severe damage to the embankment if they are uprooted during high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstruction the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.

Dam ID:	MA-0077	
Name: Ro	eservoir 40_	

d. The slope was very steep, around a 1 to 1 slope; further study is required to verify slope stability.

#### H. Abutments / Toe: (Satisfactory)

The road is located along the downstream toe.

The downstream toe was free of vegetation.

#### Findings and Corrective Actions:

a. The abutments/toe appeared to be in satisfactory condition, no corrective actions are required at this time.

#### I. Outlet Works: (Satisfactory)

The outlet pipe has a 24" diameter steel pipe.

The control of the outlet is with a valve that is on the downstream side.

#### Findings and Corrective Actions:

- a. The outlet works were not tested.
- b. The outlet works appeared to be in satisfactory condition, no corrective actions are required at this time.

#### J. Spillway: (Satisfactory)

This spillway is consisted of a channel on the left abutment.

The dimension is 25 feet and the invert elevation is 1040 feet NGVD.

The spillway approach was clear.

Erosion was not observed at the time of inspection.

#### Findings and Corrective Actions:

a. The Spillway appeared to be in satisfactory condition, no corrective actions are required at this time.

#### K. Down Stream Channel: (Unknown)

Findings and Corrective Actions:

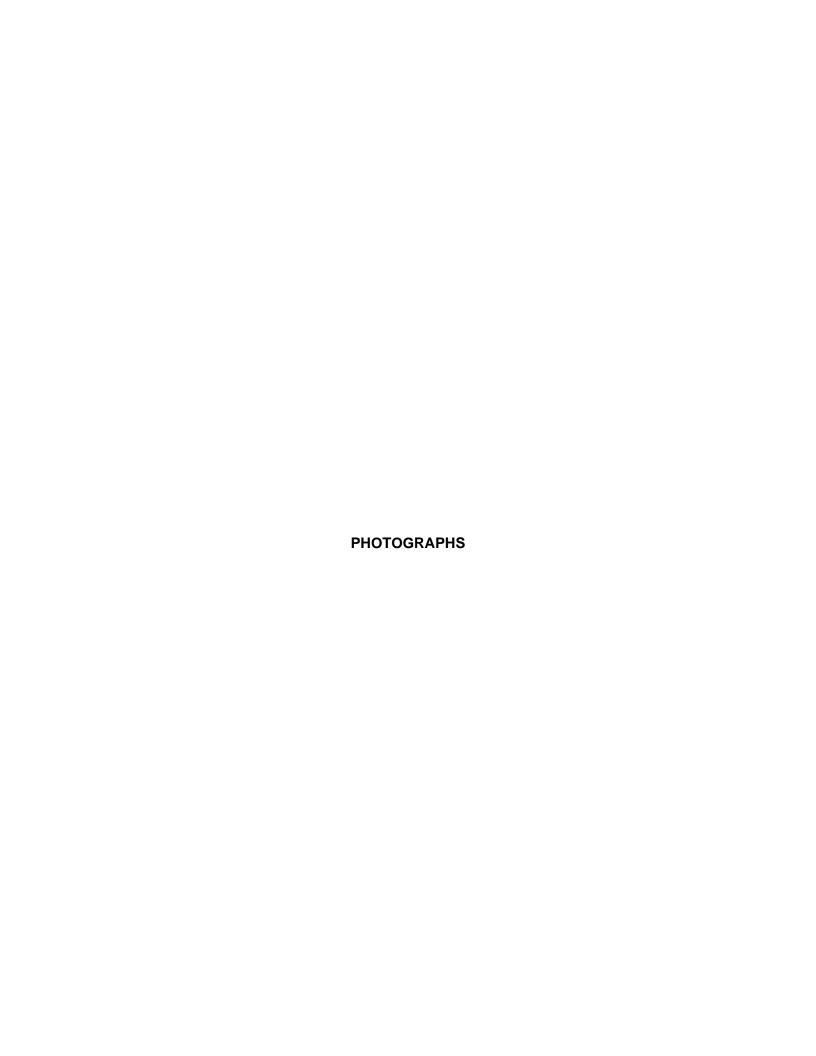
a. The downstream channel was not inspected.

#### XI. Additional Comments:

There is no immediate threat to the safety of the dam.

#### Recommendation:

The owner should continue with periodic removal of underbrush and trees from the embankment. Grasses should be kept short.





077 downstream slope of the dam



077 outlet



077 spillway



077 upstream slope of the dam



Dam	ID:	MA-0077
RESE	ERVO	IR 40



Vulnerability Index:
Extreme High Moderate Low
1 2 3 4

STATE OF HAWAII - DLNR **DAM SAFETY INSPECTION SHEET** 

Inspec	tion No:
Date:	4/4/2000

Persons Present		<b>Affiliation</b>				Phor	ne Number	
HENRI MUL	Dist	US Army Co	orps of Enginee	rs				
HIPAM YOU		DUNE						
PARITALL M		4685						
PUDLEY C		HCES						
Weather Condition:	☐ Rain previous day	/ □ Rainy □ Driz	zle / Mist □ Clo	udy/Overca	st 🖈	Partly Cloudy	√ □ Sunny	D Dry
	Comments:							
1. General: (Information Dam/Res. Name Owner	RESERVOIR 40	te as required) rcial & Sugar Comp	pany, a division	of Alexa	nder 8	k Baldwin, I	Inc.	(C01)
Dam/Res. Name	RESERVOIR 40 Hawaiian Comme			Owne	r Ph.	•		
Dam/Res. Name Owner Owner Contact Lessee	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A	rcial & Sugar Comp		Owne Lesse	er Ph ee Ph.			
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S	rcial & Sugar Comp		Owne Lesse O & N	er Ph ee Ph. 1 Ph			
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor Nearest Town	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI	rcial & Sugar Comp		Owne Lesse O & N Latitu	er Ph ee Ph. /I Ph de _		20.8183°	(decima
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor Nearest Town County	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI MAUI	rcial & Sugar Comp		Owne Lesse O & N Latitu	er Ph ee Ph. /I Ph de _			(decima
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor Nearest Town	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI MAUI	rcial & Sugar Comp		Owne Lesse O & N Latitu	er Ph ee Ph. /I Ph de _		20.8183°	(decima
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor Nearest Town County Tax Map Key(s)	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI MAUI	rcial & Sugar Comp		Owne Lesse O & N Latitu Longi	er Ph. <sub>-</sub> ee Ph. // Ph. <sub>-</sub> de <sub>-</sub> tude <sub>-</sub>		20.8183°	(decima
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor Nearest Town County Tax Map Key(s) Dam Status	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI MAUI (2)2-5-002:001 A:	rcial & Sugar Comp	Н:	Owne Lesse O & M Latitu Longi	er Phee Ph. // // Ph de _ tude _ Dam	Size	20.8183° 156.37°	(decima
Dam/Res. Name Owner Owner Contact Lessee O & M Contractor Nearest Town County Tax Map Key(s) Dam Status Year Completed	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI MAUI (2)2-5-002:001 A:	rcial & Sugar Comp	Н:	Owne Lesse O & M Latitu Longi	er Ph ee Ph fl Ph de _ tude _ Dam Dam	Size	20.8183° 156.37°	(decima (decima
Owner Owner Contact Lessee O & M Contractor Nearest Town County Tax Map Key(s)  Dam Status Year Completed Normal Storage	RESERVOIR 40 Hawaiian Comme Mr. Randall Moore N/A HC&S KAHULUI MAUI (2)2-5-002:001 A: 1926 159 ac.ft.	rcial & Sugar Comp	H: 81	Owne Lesse O & M Latitu Longi	er Phee Phdee PhdeetudeDam Dam Max.	Size Height Surface A	20.8183° 156.37°	(decima (decima 45 f

Dam ID: MA-0077 RESERVOIR 40			Inspection No:  Date: 4/4/2006
2. Questions for Owner's Rep.: Construction Plans Available Site / Facility Map Operation & Maintenance Manu Emergency Action Plan Modifications / Improvements Conduct Routine Inspections Conduct Routine Maintenance Vehicle access to site		nknown	Date: 4/4/2000  Comments  Dam crest e levation was restored near the authority. Crest was product by surface runs the  Works. Crest was product by surface runs the  Not accessible   With Standard car   Requires 4-Wheel Drive
Access during heavy rains Access when spillway is flowing Other Studies Conducted			<ul> <li>□ Not accessible</li> <li>□ With Standard car</li> <li>□ Requires 4-Wheel Drive</li> <li>□ Not accessible</li> <li>□ With Standard car</li> <li>□ Requires 4-Wheel Drive</li> <li>□ Phase I</li> <li>□ Hydraulics</li> <li>□ Stability</li> <li>□ Hazard</li> <li>□ Seismic</li> <li>□ Other:</li> </ul>
Incident History	<b>X</b> 0.		☐ Breached ☐ Overtop ☐ Slide ☐ Down stream Flooding ☐ Other: ☐ Sediment ☐ Irrigation ☐ Recreation ☐ Flood Control ☐ Drinking Water
Reservoir's Current Use  Findings and Corrective Active	R D	u	☐ Power Generation ☐ Other:
modifications, Operation  b. An Emergency Action F  c. An EAP is required for  d. An EAP is recommend  e. Submit narrative and are dam site, unless covere  f. Routine inspection logs  g. Dam owners shall prov  h. The dam did not appear  i. Access to site appears  j. There is no vehicular are or access provided.  k. Access to dam is quest and emergency plans r  l. Provide a detailed narra required to promptly ad circumstance or occurr  m. Submit current Operation	ens and Mainter Plan (EAP) is a High Hazard I ed for all dam dditional informed by approve were not inspide for routine at to be maintate to be satisfactoress to the detionable during need to reflect ative of the include the department ons and Mainter Plan (EAP) is a mainter to the include the include the department of the include the	enance on file wood ams. It is regard to the control of the contro	tion of the dam.
	hase I Study hase II Study	Ĥydraul is is	ng □ Seepage □ Hydrology/Hydraulics □ EAP) lics (including Probable Maximum Flood and spillway capacity)

Dam ID: <u>MA-0077</u>				Inspection No:	
RESERVOIR 40				Date: 4/4	/2ev Co
Physical Dam Features	Check All Applicable.	Provide description of	f Items Observed ar	nd/or Take Photos. Indicate pho	oto # in description.)
3. Reservoir: Level during inspe	ection	37,5 ft per		(gage / other)	
Normal Operating	Level/Range 32	ム 3フ′ ft per		(dage / other)	
roman operating				(Sagar outor)	
Typical Operation	☐ Spillway always flow	/		t Empty □ Drained Daily □	Only filled by Storms
Sinkhole in Res.:	☐ # Observed:	Size:	by	in. Deep K Not Visible	☐ None Observed
	Description:			•	
Staff Gage:	Description: 12034	s on the	cops to som	5/4/22	
☐ c. The reservoir☐ d. The reservoir☐ corrective Actions:☐ e. The staff gage with a	appeared to be in sa appeared to be in fai appeared to be in un e needs maintenance	ir to poor condition is atisfactory condition is and/or repair. De	n and requires contition, urgent corrections	actions are required at thi orrective action. ective action is required. od of quantifying the water	
reservoir.	t				
	is observed in the up: iuse, risk and appropi		Conduct additio	nal investigations and mo	nitoring to
4. Intake Works Descrip	otion:				
☐ Number of Intakes					
☐ Intake Culvert / F	•	mumata d Matal. El DV			
Size: Control: □ 0		can either be Shut off		crete   Other	
	Stream Diversion   Pump		• •		
Ditch / Flume	4 3				
Dimension:	0 W + 3 H (Size	x Depth) Shape	Pectagolor		
	)irt □ Wood  戊Conc	rete	Lined w/		
	Gate □ Valve □ □ Flow	can either be Shut off	or Bypassed	tin Ditch	
From: 🗆 S	tream Diversion LI Pump	D LI Reservoir	Other	the Vitch	
Findings:					
	rks were not inspecte	ed.			
/ >	rks were not tested.	satisfactory cond	lition no porrocti	vo optione our vervius d'al	. Al. ! 4!
	ks appeared to be in			ve actions are required at	uns time.
		· · · · · · · · · · · · · · · · · · ·	•	orrective action.  orrective action is require	d.
Corrective Actions:		•			-
	ks needs maintenan	ce and/or repair.	Description:		
□ g		1	ţ		

			MA-0077 R 40					- 1	nspection N ate: <u>4/</u>	0: 1/223C	
5.	Ups		eam Slope: lope Protection:			□ Fitted Rip Rap	☑ Grouted Rip R	<b>(Typica</b> ap □ Lir	il Slope ± _ ner	/:	, / · ś · · · ·
		E	rosion:		little vegetation	☐ Rut (<6")	☐ Gully (>6" dee	p) 🗆 <b>N</b> o	ot Visible	None Ob	served
		С	racks:	☐ Parallel with o	rest ☐ Perp		☐ Slide visible	□ Not \	/isible 191/No	one Observed	
		Si	inkholes:	Description:			and			/	Observed
		Ve	egetation:	☐ None ☐ Low Description: 5	Ground Cover	☐ Bushes or Ta	III Grass ☐ Trees	; #	□ <6" □		□ >20"
	Find D	a. b. c.	The upstream The upstream The upstream The upstream	slope was not slope appeare slope appeare	inspected. d to be in sa d to be in fai d to be in un	tisfactory cond	ition, no correct	es correc	ctive action.		
	Cor		tive Actions:			-wain Danawini	:				
			Slope protection Rut and/or Gu Description:		observed or			intenan	ce and/or re	pair.	
		g.	A crack was o		slope, which	•	er investigation	to dete	rmine the un	derlining ca	use.
			A sinkhole was Repair and mo	onitor the area.	•	·	_			•	cause.
		i.	The upstream maintain low to	o enable easy v	risual inspec	tion.	_				
		j.	Corrective acti	an possibly cau	ise sever da to remove th	mage to the er e tree hazards	have been ide nbankment if th from the dam. nd reconstructir	ey are u Accepta	iprooted duri able remedie	ing a high w es include re	inds. emoval

All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.

□ k. \_\_

Dam ID: MA-0077 RESERVOIR 40		Inspection No:  Date: 4/4/2006
6. Crest: Access:	Approximate Crest Width:/5	Vidth / Usage:
Erosion:	☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6	
Cracks:	☐ Parallel with crest ☐ Perpendicular to crest ☐ Slice  Description:	
Sinkholes:	☐ in. Wide x in. Long x Description:	<b>*</b>
Vegetation:	None    Low Ground Cover    Bushes or Tall Grass	
b. The dam cr c. The dam cr d. The dam cr Urgent corr  Corrective Actions e. Access alor	rest was not inspected. rest appeared to be in satisfactory condition, no correst appeared to be in fair to poor condition and request appeared to be in unsatisfactory condition and rective action is required.  s: ng the crest was satisfactory. ng the crest was not possible. Description:	uires corrective action. not expected to fulfill its intended function.
Description		
	s observed on the crest, which requires further inve area and/or repair as required.	stigation to determine the underlining cause.
Repair and	was observed on the crest, which requires further ir monitor the area.	· ·
maintain lov	the crest were not visible due to high grass and bus w to enable easy visual inspection.	
failures, and Corrective a of the tree a All repair wo	re observed along the dam crest. Trees have been do can possibly cause sever damage to the embanking action is required to remove the tree hazards from the and its root structure down to a 2" diameter and record shall be accomplished as per the requirements applied to the damaged area for signs of settlement and contents.	ment if they are uprooted during a high winds. the dam. Acceptable remedies include removal onstructing the damaged embankment section. of licensed geotechnical or structural engineer.

Inspection No:   Date:		
7. Downstream Slope:  Access:	Dam ID: <u>MA-0077</u>	
Access:   lower roadway along toe	RESERVOIR 40	Date: <u>リ/リ/マッ</u> C
Access:   lower roadway along toe     Groadway to outlet works		
Access:   lower roadway along toe     Groadway to outlet works	7 Downstream Slone:	(Typical Slope + ' ' )
Slope Protection:   None   Dumped Rock   Rip Rap   Grouted Rip Rap   Concrete   Erosion:   Loose soil willtile vegetation   Rur (e8")   Gully (e8" deep)   Not Visible   None Observed   Description:   Description:   None   None   Description:   None   None   Description:   None   None   Description:   None   None	·	
Erosion:		
Cracks:     Parallel with crest       Perpendicular to crest	·	
Cracks:		
Description:	Cracks:	
Sinkholes:		
Vegetation:	Sinkholes:	
Seepage:   Seep Spot Number 1   Green Vegetation   Wet or Muddy Ground   Ponding Water   Not Visible   Wone Observed   Plowing, Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Seep Spot Number 2   Green Vegetation   Wet or Muddy Ground   Ponding Water   Not Visible   None Observed   Plowing, Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Water Clarity:		
Seepage: Seep Soot Number 1	Vegetation:	□ None □ Low Ground Cover ☑ Bushes or Tall Grass ☑ Trees # - □ >6" □ >6" & <20" □ >20"  Description: Postives of the Discount for the Discoun
Green Vegetation:   Riowing, Description:   Wet or Muddy Ground   Ponding Water   Not Visible   None Observed   Riowing, Description:   Description:   Seep Spot Number 2   Green Vegetation   Wet or Muddy Ground   Ponding Water   Not Visible   None Observed   Flowing, Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Description:   Description:   Description:   The downstream slope was not inspected.   b. The downstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.   C. The downstream slope appeared to be in unsatisfactory condition and requires corrective action.   d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.   Function of the stope of th	Seepage:	
Water Clarity:   Clear   Some particles   Muddy   Other:		1 **
Description:    Seep Spot Number 2		
Green Vegetation   Green Vegetation   Wet or Muddy Ground   Ponding Water   Not Visible   None Observed   Plowing, Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Description:   Descriptio		
Green Vegetation   Wet or Muddy Ground   Ponding Water   Not Visible   None Observed   Flowing, Description:   Water Clarity:   Clear   Some particles   Muddy   Other:   Description:		
Plowing, Description:   Water Clarity: □ Clear □ Some particles □ Muddy □ Other:   Description:   Plowings: □ a. The downstream slope was not inspected. □ b. The downstream slope appeared to be in satisfactory condition, no corrective actions are required at this time. □ c. The downstream slope appeared to be in fair to poor condition and requires corrective action. □ d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required. □ Plower Protection needs maintenance or repair. Description: □ solope protection needs maintenance or repair. Description: □ g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required. □ h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area. □ i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection. □ g. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage. □ h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition. □ i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to de		
Description:		
Findings:  □ a. The downstream slope was not inspected. □ b. The downstream slope appeared to be in satisfactory condition, no corrective actions are required at this time. □ c. The downstream slope appeared to be in fair to poor condition and requires corrective action. □ d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.  Corrective Actions: □ e. Slope protection needs maintenance or repair. Description: □ f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description: □ g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required. □ h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area. □ i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection. □ g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage. □ h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition. □ i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct furthe		Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other:
<ul> <li>a. The downstream slope was not inspected.</li> <li>b. The downstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.</li> <li>c. The downstream slope appeared to be in fair to poor condition and requires corrective action.</li> <li>d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.</li> <li>Corrective Actions:         <ul> <li>e. Slope protection needs maintenance or repair. Description:</li> <li>g. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description:</li> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or develop</li></ul></li></ul>		Description:
<ul> <li>b. The downstream slope appeared to be in satisfactory condition, no corrective actions are required at this time.</li> <li>c. The downstream slope appeared to be in fair to poor condition and requires corrective action.</li> <li>d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.</li> <li>Corrective Actions:         <ul> <li>e. Slope protection needs maintenance or repair. Description:</li> <li>f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description:</li> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was obser</li></ul></li></ul>	•	
<ul> <li>c. The downstream slope appeared to be in fair to poor condition and requires corrective action.</li> <li>d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.</li> <li>Corrective Actions: <ul> <li>e. Slope protection needs maintenance or repair. Description:</li> <li>f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description:</li> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul> </li> </ul>		·
<ul> <li>□ d. The downstream slope appeared to be in unsatisfactory condition and not expected to fulfill its intended function. Urgent corrective action is required.</li> <li>Corrective Actions:         <ul> <li>e. Slope protection needs maintenance or repair. Description:</li> <li>f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description:</li> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul> </li> </ul>	- /	, ·
Corrective Actions:  □ e. Slope protection needs maintenance or repair. Description: □ f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair. Description: □ g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required. □ h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area. □ i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection. □ g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage. □ h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition. □ i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining	A CONTRACTOR OF THE CONTRACTOR	·
<ul> <li>e. Slope protection needs maintenance or repair. Description:</li> <li>f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair.</li> <li>Description:</li> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>		
<ul> <li>f. Rut and/or Gully erosion was observed on the slope, which requires maintenance and/or repair.         Description:         <ul> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul> </li> </ul>	Corrective Actions:	
<ul> <li>Description:</li> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	• •	•
<ul> <li>g. A crack was observed on the slope, which requires further investigation to determine the underlining cause. Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	_	y erosion was observed on the slope, which requires maintenance and/or repair.
<ul> <li>Monitor the area and/or repair as required.</li> <li>h. A sinkhole was observed on the slope, which requires further investigation to determine the underlining cause. Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	•	served on the slope, which requires further investigation to determine the underlining cause
<ul> <li>Repair and monitor the area.</li> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>		
<ul> <li>i. The down stream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>		
<ul> <li>maintain low to enable easy visual inspection.</li> <li>g. Tree(s) were observed on the downstream slope. Trees have been identified as the probably cause of piping failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds. Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	. ,	
failures, and can possibly cause sever damage to the embankment if they are uprooted during a high winds.  Corrective action is required to remove the tree hazards from the dam. Acceptable remedies include removal of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.  In the sepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.  In the sepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining	maintain low to	enable easy visual inspection.
<ul> <li>of the tree and its root structure down to a 2" diameter and reconstructing the damaged embankment section. All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	failures, and ca	n possibly cause sever damage to the embankment if they are uprooted during a high winds.
<ul> <li>All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	Corrective action	on is required to remove the tree hazards from the dam. Acceptable remedies include removal
<ul> <li>Routinely monitor the damaged area for signs of settlement and seepage.</li> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	of the tree and	its root structure down to a 2" diameter and reconstructing the damaged embankment section.
<ul> <li>h. Seepage/Ponding water was observed. Monitor and conduct further investigation to locate the source of water and extent of any possible hazardous or developing condition.</li> <li>i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining</li> </ul>	Routinely monit	or the damaged area for signs of settlement and seepage.
water and extent of any possible hazardous or developing condition.  i. Seepage was observed flowing and particles were observed to be removed by the flow. Take immediate action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining	☐ h. Seepage/Pondi	ng water was observed. Monitor and conduct further investigation to locate the source of
action to stop the loss of soil from the embankment. Conduct further investigation to determine the underlining	water and exter	nt of any possible hazardous or developing condition.
cause and take corrective action. Monitor the area.	ロー・Seepage was o	pserved flowing and particles were observed to be removed by the flow. Take immediate up loss of soil from the embankment. Conduct further investigation to determine the underlining
	cause and take	corrective action. Monitor the area.

The slope was very steep, around a 1 to 1 slope, further study is required to verify slope stability.

Dam ID: <u>MA-0077</u>				Inspect	ion No:
RESERVOIR 40				Date:	4/4/2006
8. Abutments/Toe:	<b>5</b> 1		F 0 45 (5 05 4 )		\ <del>-</del> /\
Erosion:	☐ Loose soil w/ little veg	, ,	• • • • • • • • • • • • • • • • • • • •	lot Visible	None Observed
Onadea	Description:				3./
Cracks:	☐ Parallel with crest	·			None Observed
Manage to the Comme					
Vegetation:		4 / 1	r Tall Grass ☐ Trees #		A .
_*		15 10 Cia + 201	along the down	Maryon .	7 %- R
Seepage:	Seep Spot Number 1				
	☐ Green Vegetation ☐ Flowing, Description:		und □ Ponding Water □ N	ot Visible	None Observed
	Water Clarity: ☐ Clear				
	-	-			
		**************************************			
	Seep Spot Number 2				
		•	und □ Ponding Water □ N		☐ None Observed
	Water Clarity: ☐ Clear		· · · · · · · · · · · · · · · · · · ·		
	Description:				
b. The abutment c. The abutment d. The abutment	s/toe appeared to be	in satisfactory cor in fair to poor con in unsatisfactory o	ndition, no corrective ac dition and requires corre condition and not expec	ective acti	on.
Corrective Actions:					
	on needs maintenance	•			
Description:		vea, wnich require	s maintenance and/or r	epair.	
☐ g. A crack was ol		utments/near the tage	oe, which requires furth	er investi	gation to determine the
	toe area was not visib enable easy visual ir		ass and bush vegetation	n. Clear h	igh vegetation and
failures, and ca Corrective action of the tree and All repair work	an possibly cause sev on is required to remo its root structure dow	ver damage to the ove the tree hazar vn to a 2" diamete ed as per the requi	r and reconstructing the rements of licensed ged	e uprooted ptable rer damaged	d during a high winds. nedies include removal d embankment section.
☐ j. Seepage/Pond	_	ed. Monitor and	conduct further investig	ation to lo	ocate the source of
□ k. Seepage was of action to stop t	observed flowing and	particles were ob e embankment.	served to be removed b	y the flow ation to de	. Take immediate etermine the underlining

□ I. \_\_\_\_\_

	n ID: <u>N</u> ESERVOIR	MA-0077 R 40					i -	tion No: 4/4/2w6
9.	<b>Outlet</b> Co	ulvert / Pipe	a general	and let wind	ks sowert at	1019		
		Type / Size: Culvert:		SPAN NORMAN				
		Pipe:	☐ Concrete	<ul><li>☐ Masonry</li><li>☐ Corrugated Metal</li></ul>	☐ unlined earth ☐ PVC ☐ HDPE	☐ Other		Other 54-ce
		Control Type:		. /	PVC HDPE	☐ Concr	/*	<b>N</b>
		Location:			ntrol on Downstream sid			
		Seepage:	☐ Green Veg	/ _	uddy Ground			
			-	•			<del></del>	
	Finding							
	* A	The outlet work						
	P \	The outlet work						
					y condition, no corre			
			s appeared	d to be in unsatisfac	•			its intended function.
	Correct	tive Actions:						
	□ f.	Seepage/Pond of any possible	ing water w hazardous	as observed. Cond or developing cond	uct further investiga ition.	tion to loca	ate the so	ource of water and extent
		action to stop the corrective action	ne loss of s n. Monitor	oil. Conduct further	investigation to detection in the detection in the investigation investigation in the investi	ermine the	underlini	w. Take immediate ing cause and take tlet conduit are very
	□ h.		e due to hig	_		ıh vegetati	on and m	naintain low to enable
	□ i.							

Dam ID:	: <u>MA-0077</u>						pection No:	
RESERV	/OIR 40					Date	e: <u>4/4/</u>	2006
							· · · · · · · · · · · · · · · · · · ·	
10. Sp	oillway:		å					
	Type:	☐ None ☐ Culvert/P	Pipe D Channel					
	• •	Description:	,					
	Dimension:	200 Jane	ft. Invert ele	evation: <u>/</u>	> <del>∀</del> Øft. pe	er staff ga	ıge	
		☑ None ☐ Grass						☐ Concrete
	0.0p0 : :0:00:	☐ Defect in Protection						
	Approach:	☐ Clear ☐ High Ve	-					
	Erosion:	☐ Scour ☐ Gully	=					
		Description:		/ ~				
	Vegetation:	None 🗆 Low Gro					□ <6" □ >	>6" & <20" □ >20"
	v og ottation.	Description:						
Fine	dings:							
M	a. The Spillway a	ppeared to be in sa	atisfactory condi	ition, no co	rrective actions	s are re	quired at thi	s time.
		ppeared to be in fa						
		ppeared to be in ui	nsatisfactory co	ndition and	I not expected	to fulfill	its intended	function. Urgent
	corrective action	on is required.						
Cor	rective Actions:							
		on needs maintena	nce or repair. D	escription				
		pproach was block						
		erosion was observ	ed which requir	es mainter	nance and/or re	epair.		
	Description:			\ 1	1 1			O
		tical drop in channered to prevent this p				eam or i	ne spiliway.	. Corrective
П	•	ceptable in the spil		_		ctive act	tion to addre	ess the woodv
L		blem and repair the			in rand dome.			200 mg mg mg mg
	i. Unclear if spills	way is adequately s	sized. Spillway s		s the probable	maximu	ım flood. V	erify spillway
	capacity and ta	ake corrective actio	n as required.					
	j						***************************************	
11. Do	wn Stream Chanr	nel:						
	Name:							
		Sump ☐ Open Area	☐ Un-Defined Dra	ainage-way	☐ Defined Draina	age-way	☐ Other	
	Items along Strea	•		louses	□ Town		☐ Not Inspect	
	_						•	
Ęing	dings:							
P		m channel was not		_				
		m channel appeare	ed to be in satis	factory cor	ndition, no corre	ective a	ctions are re	equired at this
r-1	time.	m channel appeare	ed to be in fair t	noor con	dition and requ	ires cor	rective activ	nn -
		m channel appeare		•				
L		nt corrective action		asiacioi y (	Jonation and H	or cybe	JOG TO TORRE	i ito intended
	•		•					
Cori	rective Actions:							

□ e. \_\_\_\_

Dam ID: MA-0077 RESERVOIR 40				Inspection No:  Date: 4/4/244	
	limited visual inspe e can be made reg nay affect the dam's	arding the dam's		liate threat to the safety of the ate. Subsequent adverse weath	ıer
Corclesi	m: Thore	was no	armand;	for threat for	
	the safety	of the	dan,		
		***************************************			
	/ //	,			

	Cura	- 5he	2mr 18	cont	mure	Cail.	K. Houle	periodiz	varene
	Comoles	brush	and	trees	from	Nul	washor	1 common of a	Gases
She	m/L	he k	ago t	short.					
5. 11.5.11.1.11.11.11.11.11.11.11.11.11.11.	and the second control of the second control	THE PROPERTY OF THE PARTY OF TH	b.s-arranamannamanna	ammi kurandika eramakar-ere ererer	goggotop, war got governin, et noor e enement up geen een ee		navergor 1.3.a. een voor aantgevan 2 40000 maandaluur - 4	aantergoodskerooos valteerings aanter eroop Varenige kein ander a varendrys	e december de decembra de la completa del completa de la completa del completa de la completa del la completa
en anna macroniscean e a cast la seri est accesa		alga, artalika eta e, gare a elaraga eta ililiar forma.	The College Control of the Security of the Sec		an erroldskin besenskala av som trette ver visterer over ster				AND THE STATE OF T
CONTRACTOR OF THE STREET	ar an un managarana ang araw a a a ana tao ahii 1446° 48° 48°	2 minut o decisio servicere es escocere de es		gyddydd diregydd y ac y gleidyd y charlon i ar og englainiae o'i gann o		anne estre didire estrenamento de la cidade caled	de mir in alguert and ince the strike to attitue their en		
er was e su um was a som was de serra su sa a res u	and the first and to describe the set of the	and the second district the police of the original and the second district the second	enter deservatives to see a transfer	al a samigles (i), or one is a side commonweak arrow it would do not a deplicable	and and a suit a solid annula advises a subdificulti and delicate for allower	turbiquetteri indette til seks i 1900 sindette		PO A CANA DALIMBER AND REPORTED AND MANUFACTURE AND STATE OF THE STATE	мента поточнять по поставлення в поставлення в почения на почения на почения на почения на почения на почения

#### **Limitations and Intent of this Dam Safety Inspection:**

This Dam Safety Inspection was conducted to assess the general overall condition of the reservoir/dam, identify visible deficiencies, and recommend areas of for monitoring, additional investigative studies and corrective actions. The inspection is based only on visible features/areas of the dam on the day of inspection. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies. The inspection was conducted under the authority of the Hawaii Revised Statures Chapter 179D, and Hawaii Administrative Rules, Title 13, Chapter 190, titled "Dams and Reservoirs". Questions regarding this inspection should be forwarded to the Hawaii State Dam Safety Program; PO Box 373; Honolulu, Hawaii 96809; Ph. (808) 587-0236.

Revised: Dec. 1, 2003